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TEMPERATURE OF THE EARTH'S CRUST.

[Abridged from an article, by Mr. EDWARD HULL, F.R.S., in the "Quarterly Journal of Science" for January.]

Some years since, Mr. R. Were Fox undertook a series of experiments on the temperature of the Cornish mines, which are reported in the "Transactions of the British Association."* These experiments appeared to show that the increase of temperature was in a decreasing ratio to the depth; but it is to be recollected that in the case of mines the temperature is affected by several sources of error, such as the spontaneous combustion of pyrites. The results, however, are not without value, and are as follows:—

At a depth of 354 feet the temperature was 60° Fahr.
" 792 " " 70° Fahr.
" 1434 " " 80° Fahr.

Assuming the invariable temperature, presently to be explained more fully, to be 50° Fahr., the rate of increase would be arrived at as follows:—

10° at 354 feet, less 50†=304 feet, or 1° in 30·4 feet.
of 10° at 438 feet or 1° in 43·8 feet.
and of 10° at 684 feet or 1° in 64·2 feet.

The observations taken in the Tresavean Mine in 1837, which were the deepest of the series, gave the following results:—

At 1572 feet from the surface the temperature was 82·5° Fahr.
At 1740 " " 85·2° Fahr.
At the above depth in another lode " 86·2° Fahr.
" In a third lode " 92·1° Fahr.
Giving the mean temperature for a depth of 1740 ft. 87·9° Fahr.

Mr. R. Hunt, F.R.S., who has made some observations in reference to the question of increase of temperature in mines, states that he has found the temperature as high as 100° at a depth of 1920 feet (320 fms.) in the Tresavean Mine.

Several carefully executed experiments carried on in coal mines have been recorded; and amongst the earliest on which much reliance is to be placed are those of Prof. J. Phillips, F.R.S., at Monkwearmouth Colliery, near Sunderland, at a depth of 1590 feet, from water issuing from a coal seam at a depth of 1499 ft. below the sea level, and which gave a resulting increase of temperatue of 1° for every 60 feet.‡ During the sinking of Rose Bridge Colliery, near Wigan, to the celebrated Cannel seam, between the years 1854-61, careful observations of the increase of temperature were made by the manager, Mr. Bryham, and communicated to the author; the following are the results:—

At a depth of 443 feet the temperature was found to be 64·5 Fahr.
" 564 " " 66° Fahr.
" 1650 " " 78° Fahr.
" 1800§ " " 80° Fahr.

Taking the invariable temperature at 50°, and at a depth of 50 feet the resulting rate of increase is 1° Fahr. for every 58·3 feet.

But of all the observations as yet made, perhaps the most elaborate are those which were undertaken by Mr. W. Fairbairn, F.R.S., during the sinking of the Asthley Pit of the Dukenfield Colliery, in Cheshire.‖ These observations were carried on over a period of ten years (between 1848-59), and reach downwards to a total depth of 2151 feet from the surface. Great care was taken to remove the thermometer from the disturbing influences either of the air in the shaft or of water in the strata. The instrument was as often as possible inserted in a dry bore-hole in advance of the sinkings, and left in its bed from two hours to two days, according to circumstances. Fifty-two observations are recorded, and range from an invaraiable temperature of 51° Fahr. at a depth of 16½ ft. from the surface to 75·5° at the bottom of the pit, and 75·0° at 22 yards lower in roof of the "Black Coal," taken seven months afterwards. This last observation does not, in all probability, give the original temperature of the stratum, which we may well suppose was somewhat lowered, owing to contact with the air. Rejecting for the above reason the last observation, we find that there has been an increase of 24·5° in 2040 feet; so that the average rate for the whole depth is 1° for every 83·2 feet.

This series of observations is the most valuable of any that have been made in this country, both as regards the unsurpassed depth to which they extended, and the care that was taken to insure accuracy. On the whole (with occasional minor variations), they show a remarkable uniformity in the rate of increase, and induce confidence in the results. From the following analysis it will be observed that at the lowest depths the rate of increase was nearly as great as at any portion of the descent:—

The first observations gave 51° as the invariable temperature at a depth of 16½ feet, as already stated.
Between 693 ft. and 710 ft. the temperature was nearly uniform at 58°.
Between 710 and 927 ft. the rate of increase was 1° for 62·4 ft.
Between 927 and 1257 ft. the rate was 1° for 64 ft.
Between 1257 and 1839 ft. the rate was 1° for 86·9 ft.
Between 1839 and 2055 ft. the rate was 1° for 65·6 ft.

And the mean of the whole series of observations gives 1° for every 83·2 feet, which is under the average of the observations.

The increase of temperature appears to be independent of altitude of the place, or of the density of the air, as proved by the observations of Humboldt.¶ Thus, in a silver mine in the Andes of Peru, at an elevation of 11,875 English feet above the sea, the temperature was found to be 25·4° Fahr. higher than the external air. In another mine, at the same elevation, the difference between the temperature of the internal and external air was found to be 15·8° Fahr., and the water streaming down the rock showed 52·3° Fahr. These observations were repeated in other localities with similar results.

The concurrent testimony, therefore, of all the observations which have been made is in favour of an increase of temperature, though at rates varying considerably from one another, and this has been established as holding good down to a depth of about 2400 feet from the surface. What seems to us now to be required, and for several reasons, is a series of experiments made at even greater depths.

First,—With so many recorded observations, all approximately concurring towards one conclusion, any sinkings or borings to a depth of less than 2000 ft. would, in all probability, only afford another series of similar results, and would be so much money uselessly expended; and, secondly, it seems probable that at greater depths several sources of error would be avoided. Of all these sources of error, the percolation of water through the strata is, probably, the most formidable; now, it has generally been found that the quantity of water in coal mines derived by percolation from the surface decreases in proportion to the depth, and at depths greater than 500 or 600 yards the mines are dry. It is somewhat difficult to account for this where there are thick beds of porous sandstone, but it is to be recollected that a rock which is full of joints and fissures at the surface is often found extremely solid at a considerable depth, and the friction, or resistance to percolation, and the particles of which it is composed, offers an accumulative obstacle to the passage of water downwards, more than balancing the hydrostatic pressure, and amounting at length to an absolute stoppage. This is a conclusion which wells in the New Red Sandstone—itself a very porous rock—seem to offer, for after a certain depth has been reached the increase of supply appears to take place in a diminishing ratio to the depth,** and we may suppose a zero point would ultimately be reached.

As far, then, as our experience goes, it is very probable that at depths greater than 2000 feet no water would be found in ordinary coal measure strata, and thus by sinking in this formation a principal source of error would be avoided. Other means of error (such as those arising from differences in density and conducting power in the several varieties of strata), being of less moment, would disappear, or become inappreciable, on taking the mean temperature of very deep borings.

After much consideration, the plan which we venture to recommend, in case of experiments being undertaking by the British Association, or any other scientific society, would be, not to commence at the surface, but at the bottom of a coal mine, of not less depth than 600 yards. There are several collieries, particularly in Lancashire and Cheshire, sufficiently deep for the purpose. It would be an easy matter to excavate a chamber in the coal and its roof, where the borings might be carried on. The chamber ought to be a short distance from the bottom of one of the shafts, and out of the way of mining operations. As the process of boring progressed observations should be taken at every 10 yards, and at every change of strata from sandstone to shale or coal. The boring might be carried down at least to a total depth of 1000 yards from the surface, and having been completed under proper supervision, could not fail to give results of value to science. It is also probable that a proprietor of some colliery of the required depth would willingly afford the facilities for carrying on the experiment, for the sake of the information he would derive regarding the minerals underlying the coal seam then worked.

* Vol. ix. † 50 feet from the surface is here assumed as the depth of no variation of temperature all the year round.
‡ "Philosophical Magazine," vol. v.
§ Another observation was made nine months afterwards, when it was found the temperature had cooled down 8°, or from 80° to 72°, owing to contact with the down-current of air.
‖ See account of these observations by Mr. W. Hopkins, F.R.S., in the "Philosophical Transactions," vol. cx vii. ¶ "Cosmos," Sabine's Trans., vol. iv.
** As may be gathered from the account of the sinkings at the Green Lane Well of the Liverpool Corporation Waterworks. See "Quarterly Journal of Science," vol. ii., p. 421.

PROGRESS OF COPPER MINING IN TURKEY.

In the present depressed state of the copper market we do not want any more influences to bear down the market, but yet the evident tendency is to an increase of the supplies, while there appears little prospect of an extension of the market. Besides what has taken place in the United States and in Chili, we may always look for the opening up of the old and ill-worked countries—Turkey, Persia, and Japan, for example. The extension of railways and steam navigation, the improvement of communication, the diminished cost of transport, and above all the spread of intelligence, all have the tendency to increase mining production. We may also make this remark, that on the same terms that copper is poured into our market, so is our iron trade liable to diminution by the corresponding establishment of ironworks. In India, Asia Minor, Persia, and the Brazils hematite and other formations have been made ready, as it were, for the development of enterprise.

The example we have now to bring forward is with regard to the copper mines of Asia Minor. The copper mines of Tokat have long been well known in commerce, and these, with other copper and silver mines, are worked on the ancient system of Government monopoly. The Turkish conquerors inherited the system from their predecessors, and there is every appearance that the present mode of administration is at least as old as the time of the Romans, and perhaps of very remote antiquity, as old, perhaps, as what are called the great historical empires.

The general method may be thus described. The miners and the smelters are taken from the neighbouring population, and are exempt from conscriptions, military duties, and taxes, receiving a small nominal pay. A regular trained mining population is thus kept up, and it must be allowed that the Turkish miners display considerable intelligence, and are hardworking, well-conducted men. Under more favourable circumstances Turkey would reap the benefits of such a population, which would be available for mining operations throughout the empire, but it is the nature of monopoly to defeat itself. The monopoly of mining in the hands of the Government in the reserved districts limits their development; and although the Government now sincerely wishes to promote mining in other districts, yet the mining regulations they have adopted from the French are so detrimental that they deter operators, although the Mining Department is disposed to waive all impediments. So far as Tokat, Arghana, &c., are concerned, their development in the hands of the Government, being dependent on the extent of local population, is necessarily limited. In ancient times, and particularly in the Greek and Roman periods, slave and convict labour was available, and an expansion would take place within these limits. Now that slavery has been long diminishing in the Turkish dominions, and is nearly extinct, there is no supply of labour in that quarter.

The supply of taxable labour for the mines, besides miners and smelters, of course, includes wood-cutters and charcoal-burners, but besides these several districts supply means of transport, enjoying in compensation various privileges.

As a matter of course, a kind of mining aristocracy, or bureaucracy, has sprung up, filling from generation to generation various offices, taking small salaries, and numerous prescriptive fees, some fattening, others content to vegetate, but all at the expense of the State, and constituting an obstructive element, opposing improvement. Thus, although the monopoly mines produce to the Turkish Treasury a considerable nett sum, it has long been felt by Turkish statesmen to be very questionable whether, putting the loss of taxes and soldiers in the privileged districts on the other side of the account, it would not be better for them to get rid of the mines.

Their attention has been for some time turned to the desirability of getting rid of the local functionaries and jobbers, but they have proceeded tenderly about it, for, as a matter of course, these parties have numerous protectors. The new Mining Department at Constantinople, although possessing some able men, has made slow way. It has been a dead burden on the Treasury, and it has always been difficult to get salaries for pupils sent to the Mining Schools of London and Paris, and for English and French engineers. Whenever a budget was to be made up the little Mining Department was always one of the topics of economy, and any plan for its development was sure to be postponed till better times, though it was well recognised that the development of mining is one necessary measure for increasing the resources of the Treasury.

Some of the chief of these mines are in the mountains of Armenia, on the head waters of the Tigris and Euphrates. Indeed, the whole of the head valley of the Euphrates is a great mineral country, and the same may be said of the neighbouring but smaller valley of the Tigris. This we shall call the Arghana, or eastern district; the better known Tokat district is to the west, in Asia Minor. The Arghana district, of which we are now going to speak, is unfavourably situated for communication. Its water navigation on the Euphrates and the Tigris leads in the wrong direction, to Bagdad and the Persian Gulf, and not to the westward. There is, therefore, a long land carriage, either to the Black Sea or the Mediterranean. This is one cause which tends to check the development of the mines.

The attention of HALIL PASHA, when lately Minister of Public Works, was particularly directed to the Arghana mines. HALIL PASHA was educated at Woolwich, and he employed another English-bred Turk at Arghana. AHMED BEY was brought up in the Royal School of Mines, Jermyn-street, where he completed his education, and this brought him under the notice of HALIL PACHA, one of the few English-speaking officials. AHMED BEY, then major, was created a member of the Technical Council of the mines of Arghana, and, under the PASHA'S directions, he succeeded in one year in increasing the produce threefold, at the same time improving the quality. Arghana used to turn out a dark, unrefined copper, which was sent to Tokat to be refined, and now the Arghana copper has been made equal to Tokat refined, if not superior. Thus there is a material saving of transport between Arghana and Tokat. Another source of produce has been from cementation. The mine waters have hitherto been allowed to run into the Euphrates, and they contain copper to such an extent that a ton a day is now recovered. Basins for cementation have been formed, and have well repaid the outlay. Such has been the success, that AHMED BEY has been promoted to the rank of lieutenant-colonel, and appointed director of the smelting-works of Tokat.

In consequence of those economical administrative arrangements to which we have referred, the Arghana mines were last year transferred from the Ministry of Public Works to that of Finance. Such, however was the success of HALIL PACHA'S administration in this respect that Arghana was put under his direction on his retirement from the Ministry of Public Works, and appointment to the post of Director-General of the Arsenals and Factories of the Empire. In this capacity HALIL PACHA well knows the value of copper as a material employed in his workshops.

A further measure now contemplated for giving an extension to Arghana is a scheme for constructing a railway, or tramway, from the mines to the Mediterranean. On this we have not full particulars, but, as we have been informed, the real basis of the operation is to make regulus at Arghana for the future, instead of copper, and ship it for the English market. A plan has been got up on the spot, and negociations have for some time been carried on on behalf of parties in England, while surveys have been made by some of the English engineers in Turkey. According to another account the mineral produce to be shipped will be the rich copper ore of Arghana. This appears the more likely, as the quantity estimated for the railway is 30,000 tons per annum.

The scheme is ingeniously devised. Instead of a general guarantee of interest by the empire, which hitherto has not worked well on the railways, and which has embroiled the Government with the companies, and which, besides, has this disadvantage, that the credit of the Government is low in the European markets, it is proposed that the Government shall guarantee to furnish for 25 years 540,000 kantars, or 30,000 tons of ore. This, at only 5*l.* per ton, would give a gross revenue of 150,000*l.* a-year. The concession is to be for 50 years, the line then to be the property of the Government by purchase.

The progress of the Arghana mines has given great confidence to the Ottoman Government. The mining code is proposed to be simplified, and the royalties reduced; but although this plan has long since been formed and settled, it has not yet received legislative sanction. It is also intended again to separate Arghana from the Ministry of Finance, and refain it under HALIL PASHA. There is also some talk of placing under his charge all the State or domain mines of the empire, as a natural appendage to the factories, they being strictly works of the State.

The Government has a strong desire to keep under its own management the old copper and silver mines, and the proposed plan, so far as Arghana is concerned, would comply with that policy, but the financial necessities of the Treasury will, no doubt, ultimately compel the Porte to alienate the mines to some of the numerous applicants who from time to time demand this special security. Of course, the extension of Arghana is only preparatory to that of Tokat, under the management of AHMED BEY, so that we may look forward to increased supplies from both districts, or an extension of the area of its trade, driving out the English article from some of the Mediterranean markets.

MINING DIVIDENDS DURING THE YEAR 1868.

Shares.	Mines.	Amount paid.	Dividends.	Present price.
1,024	Devon Great Consols	£1 0 0	£39,936 0 0	£320 340
1,800	Minera	25 0 0	36,000 0 0	175
15,000	Great Laxey	4 0 0	30,000 0 0	19 20
3,000	West Chiverton	10 0 0	24,000 0 0	59 61
512	South Caradon	1 5 0	17,408 0 0	340 360
17,000	Wicklow	2 10 0	9,350 0 0	11⅝ 11¾
400	West Wheal Seton	47 0 0	9,200 0 0	200 220
358	Dolcoath	128 17 6	8,734 0 0	450 470
5,908	Great Wheal Vor	40 0 0	8,123 10 0	11 12
9,000	Marke Valley	4 10 6	7,650 0 0	8¼ 9
1,024	Herodsfoot	8 10 0	6,104 0 0	43 45
6,000	Tincroft	9 0 0	6,000 0 0	17 18
400	Llaburne	18 15 0	5,400 0 0	
300	East Darren	32 0 0	4,200 0 0	
40,000	Mwyndy Iron	3 5 0	4,000 0 0	
128	East Pool	24 5 0	3,840 0 0	
1,024	Wheal Mary Ann	8 0 0	3,584 0 0	20 22
867	Cwm Erfin	7 10 0	3,251 5 0	
12,800	Prince of Wales	0 12 6	3,200 0 0	24s. 26s.
2,000	Trumpet Consols	11 10 0	3,000 0 0	15 16
3,000	Maes-y-safn	20 0 0	3,0 0 0	
2,800	Foxdale	25 0 0	2,800 0 0	
1,120	Providence	10 6 7	2,800 0 0	34 36
512	Wheal Jane	10 15 0	2,560 0 0	40 45
6,000	South Darren	3 6 6	1,800 0 0	
512	Wheal Basset	5 2 6	1,792 0 0	80 90
4,295	Wheal Kitty (St. Agnes)	5 4 6	1,718 0 0	4 4¼
1,000	Bronfloyd	12 0 0	1,500 0 0	17
1,500	Alderley Edge	10 0 0	1,425 0 0	
916	Cargoll	15 5 7	1,374 0 0	20
5,094	Bwlch Consols	4 0 0	1,273 10 0	4
937	South Wheal Crofty	24 10 10	1,037 0 0	13 14
4,000	Brookwood	1 11 0	1,000 0 0	
496	South Wheal Frances	18 18 9	992 0 0	14 15
1,906	East Wheal Lovell	3 9 0	958 0 0	9 9¼
396	Wheal Seton	58 15 0	792 0 0	80 85
280	Derwent	300 0 0	700 0 0	
509	Creegbrawse and Penkevil		636 5 0	
165	Levant	10 8 1	632 0 0	
2,450	Cook's Kitchen	19 14 9	612 10 0	13 14
80	Wheal Owles	70 0 0	600 0 0	
3,950	Gawton	3 10 6	600 0 0	
6,400	Cashwell	2 10 0	480 0 0	
508	Summer Hill	3 18 6	317 10 0	
256	Gwmystwith	60 0 0	256 0 0	
1,280	Chanticleer	0 7 8	64 0 0	
76,162	Don Pedro North del Rey	0 14 0	49,981 6 3	4 4⅛
15,000	Cape Copper	7 0 0	18,750 0 0	13 14
10,000	Pontgibaud	20 0 0	16,000 0 0	10 12
13,500	Vancouver Coal	6 0 0	14,799 3 4	8 9
100,000	Port Phillip	1 0 0	6,250 0 0	1¾ 2
35,000	Alamillos	2 0 0	6,125 0 0	1¼ 1¾
25,000	Fortuna	2 0 0	5,625 0 0	1½ 2
70,000	English and Australian	2 10 0	5,250 0 0	¾ 1
15,000	Linares	3 0 0	5,000 0 0	2½ 3
68,000	Kapunda	1 0 0	1,700 0 0	
120,000	Scottish Australian	1 0 0	1,600 0 0	⅞ 1⅛
20,000	Australian	7 7 6	500 0 0	
	Total		£96,279 13 4	

THE COPPER TRADE.—Messrs. Pitcairn-Campbell and Co. (Jan 15) write—The same unsatisfactory features which we had to remark upon at the end of 1867 characterised the course of the Copper Market in 1868 until near its close, when, without any reasons based upon altered statistics, the unduly depreciated condition of the article forced itself upon the attention of the public, and since Dec. 1 an advance of 10 to 12 per cent. has been realised, the market closing with a buoyant feeling. The reorganisation of the Smelters' Association has materially assisted this result, and it is to be hoped that the depression so long existing may be permanently removed, in view of a decided general improvement in trade throughout the country, and also of the fact that late prices had become totally unremunerative to the bulk of producers. Quotations are 75*l.* for bars, 78*l.* to 79*l.* for ingots, 15*s.* to 15*s.* 3*d.* for ore and regulus, 15*s.* 9*d.* to 16*s.* for Barilla. The smelters' quotation for tough copper is 81*l.* 10*s.* and 85*l.* 10*s.* for Indian sheets. Business transactions during the past fortnight comprise, on the spot here, 2120 tons bars at 72*l.* to 75*l.*, 370 tons ores at 15*s.*, and 30 tons Corocoro Barilla at 15*s.* 6*d.* To arrive here, 540 tons bars at 72*l.* 15*s.* to 7 *l.* 10*s.*, and 600 tons regulus at 14*s.* 9*d.* On the spot, Swansea, 300 tons bars at 75*l.*, 40 tons ingots at 80*l.*, and 160 tons regulus at 14*s.* 6*d.* To arrive, Swansea, 150 tons bars at 72*l.* 10*s.*, 70 tons ingots at 77*l.*, and 1420 tons regulus at 14*s.* 6*d.* to 15*s.* 3*d.*, or about 4600 tons fine copper. Arrivals here during the fortnight from West Coast, S. A.:—Magnet, from Caldera, 600 tons bars; Cuban, from Colon, 60 tons Barilla; Ellen Lamb, from Valparaiso, 460 tons bars; Enid, from Valparaiso, 600 tons ores, 60 tons bars; St. Thomas, 26 tons Barilla. At Swansea,—Epsilon, from Coquimbo, 326 tons ores, 418 tons regulus, 55 tons ingots; Hercules, from Carrizal, 458 tons regulus; San Fernando, from Carrizal, 386 tons regulus, 148 tons bars, 22 tons ingots.

Stocks of copper (Chilian and Bolivian) in first and second hands, likely to be available, are—

	Ores.	Regulus.	Bars.	Ingots.	Barilla.
Liverpool	1725	650	6250	800	186
Swansea	3136	3376	1151	41	222
Total	4861	4026	7421	841	408

Representing about 11,300 tons of fine copper, against 8350 tons Jan. 15, 1868; 7550 tons Jan. 15, 1867; and 11,000 Jan. 15, 1866.

By the following figures it will be seen that there has been an increase in the supplies of copper, and we make the quantities available as follows:—

Imports of foreign ores, regulus, bars, and ingots	1868.	1867.	1866.
into Liverpool and Swansea ..... Tons fine	55,016 ..	47,6 9 ..	41,903
Ditto ditto into London	5,012 ..	4,932 ..	6,843
Cornish sales, 118,715 tons ores = in fine	7,779 ..	8,027 ..	8,790
British, other than Cornish and Irish = in fine	1,500 ..	1,50 ..	800
Copper made from foreign pyrites	3,000 ..	2,848 ..	2,000
Total	72,337	64,936	60,336

The particulars of foreign copper, imported into Liverpool and Swansea, are—

From Chili and Bolivia:	Ores.	Regulus.	Barilla.	Ore & Reg. Slab.	Tons fine.
Into Swansea	9,251 ..	22,877 ..	165 ..	13,138 ..	5,732 .. 18,870
Into Liverpool	6,181 ..	5,464 ..	2049 ..	5,198 ..	20,939 .. 26,137
From Cuba and all other sources into Swansea and Liverpool	15,432 .. 53,483, at 16½ p. ct. —	27.841 ..	2214 ..	18,336 .. 8.634 ..	26,671 .. 45,007 1,405 .. 10,039
Total	68,915 ..	27,841 ..	2214 ..	26,960 ..	28,076 .. 55,056
Against in 1867	47,825 ..	28.851 ..	1372 ..	23,545 ..	24,084 .. 47,629
" 1866	18,177 ..	34,310 ..	1530 ..	— ..	12,522 .. 41,905
" 1865	75,046 ..	39,969 ..	565 ..	— ..	18,284 .. 51,556
" 1864	61,348 ..	25,386 ..	1260 ..	— ..	19,691 .. 43,081
" 1863	72,970 ..	18,066 ..	942 ..	— ..	9,470 .. 31,324
" 1862	68,047 ..	36,169 ..	1110 ..	— ..	9,749 .. 40 326

It cannot fail to be remarked from this that the preponderance of bars and ingots is becoming more and more manifest. The copper imported into London has been—1868, 5012 tons; 1867, 4932 tons; 1866, 6843 tons; 1865, 2947 tons; 1864, 4503 tons; 1863, 2707 tons.

Copper exported from Liverpool and London in the twelve months:—

	British manufactured.	British unmanufactured.	Foreign unmanufactured.	Total.
1868	13,195	3878	16,133	33,207
Yellow metal	10,896 at 60 per cent. copper			6,538
Copper, &c., from Swansea				3,941
Total				43,686
Against, In 1867				44,186
" In 1866				34,476
Of the above, 13,969 tons go to India.				

According to the Board of Trade Returns, for the first eleven months, the exports of copper, yellow metal, brass, &c., from the whole country, show an increase of a very important character:—

1868 ..... Tons	52,109	1866 ..... Tons	36,317
1867	46,527	1865	36,295

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